NORTHFLEET'S FORGOTTEN TUNNELS

Henley's Second World War Industrial air-raid shelters

By Victor Smith

Subterranea Britannica
Gravesend Historical Society

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Henley's industrial WWII air-raid shelter tunnels at Northfleet, Kent

Victor Smith

Looking north along the central latrine tunnel in 2007. Photo Nick Coombs

Formed of tunnels in the chalk, some 55 ft below Fountain Walk at Northfleet in Kent, is a large Second World War industrial air-raid shelter complex. It was created as a refuge for 2,500 employees of the W.T. Henley Telegraph Works and its associated companies, whose Thameside premises were adjacent. The need for physical protection reflected the increasingly destructive and existential threat of aerial bombing and of a national imperative to safeguard skilled industrial workers – and at some places elsewhere, factory plant as well. As such, the survival of this complex evokes a memory of the determination of government, industry and people to survive the onslaught of the German air campaign and to win the war. The shelter incorporated the latest thinking in design and protective measures. This wartime underground heritage is of at least regional heritage importance and might be considered for statutory protection.

This study was preceded by the author's research visit to the tunnels in 2003/4 in cooperation with Thames Defence Heritage and the Kent Underground Research Group (KURG) and by a mention of the site in his report of the Kent Thameside section of Kent County Council's 20th-century *Defence of Kent Project* in 2010. It also benefits from contributions of information and thoughts from Robert Hall and Paul Thorne, also of KURG. This study is also supported by the Kent Defence Research Group of the Kent Archaeological Society and by the Gravesham Heritage Forum.

Background

The threat of bombardment from the air had been predicted since the late nineteenth century by such writers as Jules Verne, George Griffith and, evocatively in 1908, by H G Wells in his *War in the Air*. In the latter, Wells noted the potential for this form of attack to destroy ground targets, including industrial assets and national infrastructure. Coincidentally, and following earlier technical interest, it was in the same year as the publication of Wells' story that the British government formed a committee to consider the possibilities and the threats from the development of military aviation.

This led, over the next five or so years, to a growing recognition of the menace it represented to home defence and, in 1913, a dummy air bombing exercise took place in the Medway area. During the Great War, industry, docks and other assets along the Thames were embraced within an increasing deployment of gun defence, balloon

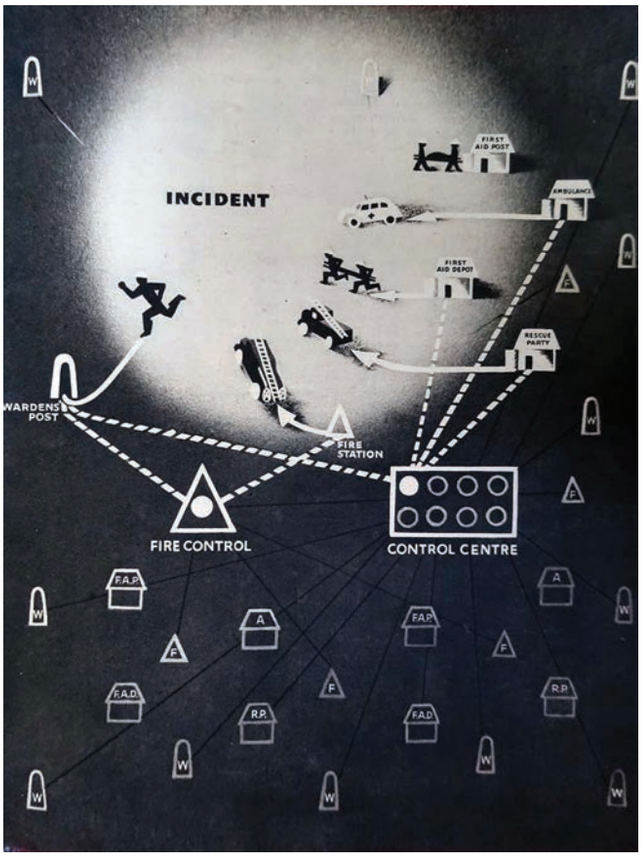
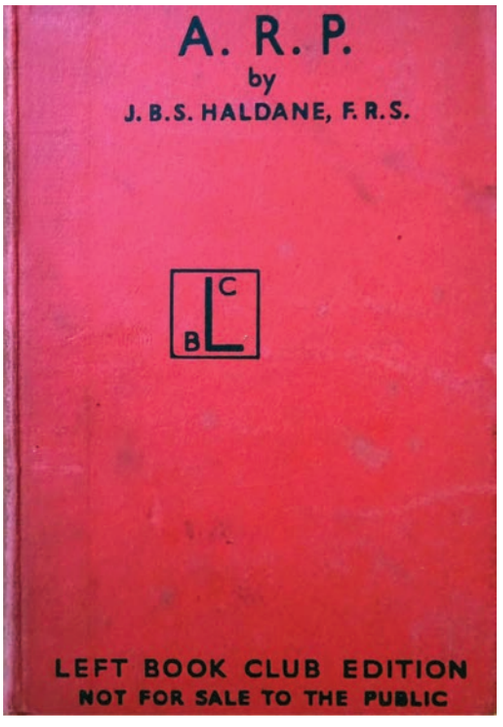
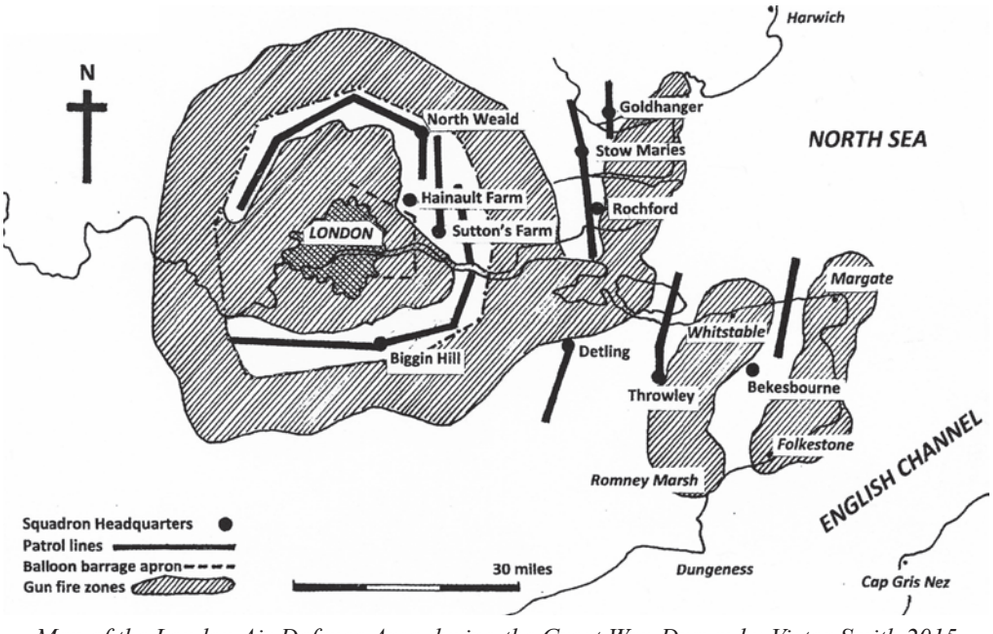


Diagram of a typical civil defence organisation as it evolved during the Second World War: from 'Front Line 1940-41', HMSO, 1942.



Cover of the influential book, 'ARP, by JBS Haldane, London, 1938



Map of the London Air Defence Area during the Great War. Drawn by Victor Smith 2015

barrages and fighter protection, evolving into the London Air Defence Area. Some impromptu shelter provision was also made, reportedly in the use of suitable parts of existing buildings, with some limited new construction. It is not impossible that existing chalk tunnels on Thameside were designated for use as shelters. Certainly, new shelter tunnels were created in chalk in East Kent and at Chatham but more about this subject needs to be discovered.

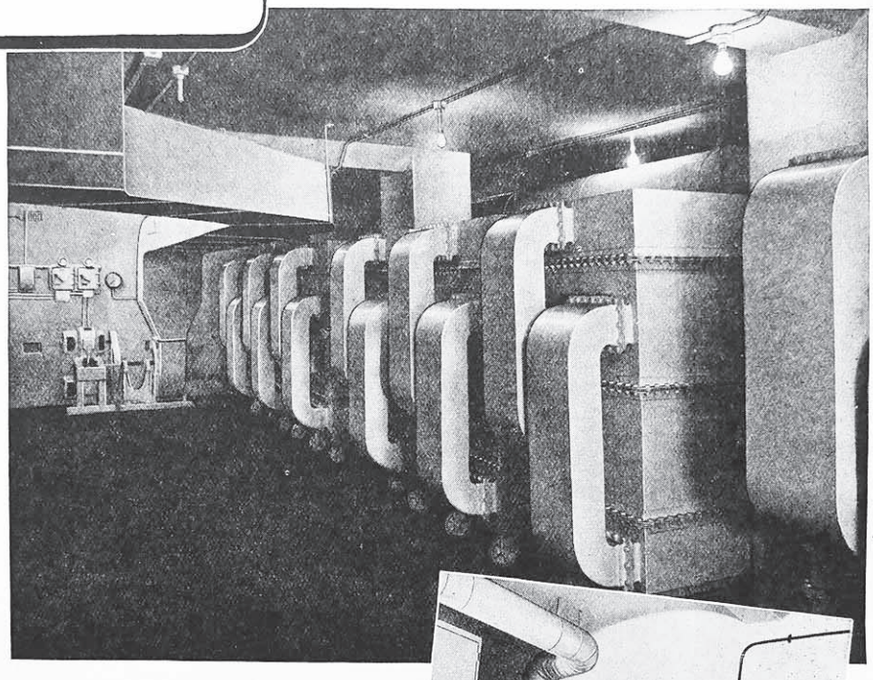
Although WWI air attacks proved not to be a serious impediment to the operations of industry or to the war effort, they diverted resources to provide for countermeasures and were a salutary lesson of the likely greater destruction in any future conflict. But, after 1918, the possibility of a new major European war seemed unlikely for some years. By default, in the early 1920s defence planning centred on maintaining military air parity with France, the next most powerful continental state. As part of this, 'passive' air-raid precautions (ARP) began to receive government attention including, on a small scale, the production of bespoke designs for air-raid shelters.

The statement of the former (and future) Prime Minister Stanley Baldwin in 1932 that, in future wars, 'the bomber would always get through' and the subsequent perceived menace of German re-armament and expansion of her air force, engaged the thoughts of British politicians and defence planners. It was predicted that a future air war would start with heavy bombing of populations, military, industrial and infrastructural resources, intended to deliver an early and decisive knock-out blow in an attempt to compel surrender.

Carrier

GAS DEFENCE AIR FILTRATION SYSTEM

SHELTER VENTILATION has been installed by Carrier in Report Centres, First Aid Posts, Control Rooms, Buildings of H.M. Government, Colonial Governments, leading Railway Companies, Banks, local authorities and public utility undertakings.



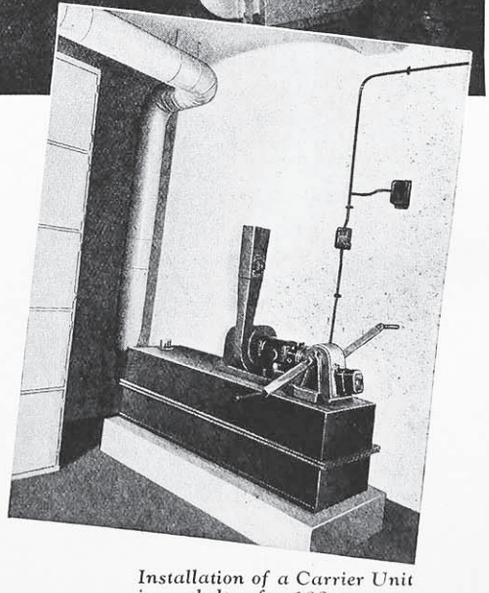
A large Carrier Air Filtration Plant installed in a London Bank.

The Carrier Units of 50 and 100 person capacity have passed all official tests and bear the Home Office Certification Mark, LICENCE No. 1.

Guaranteed protection is provided by the Carrier Air Filtration System against all poison gases. Smoke, the principal cause of panic in a shelter, is completely eliminated.

The Carrier System of Ventilation reduces the floor space required for any given number of persons, thus making a considerable reduction in the total cost of the shelter.

Write for Gas Defence Booklet No. 16.

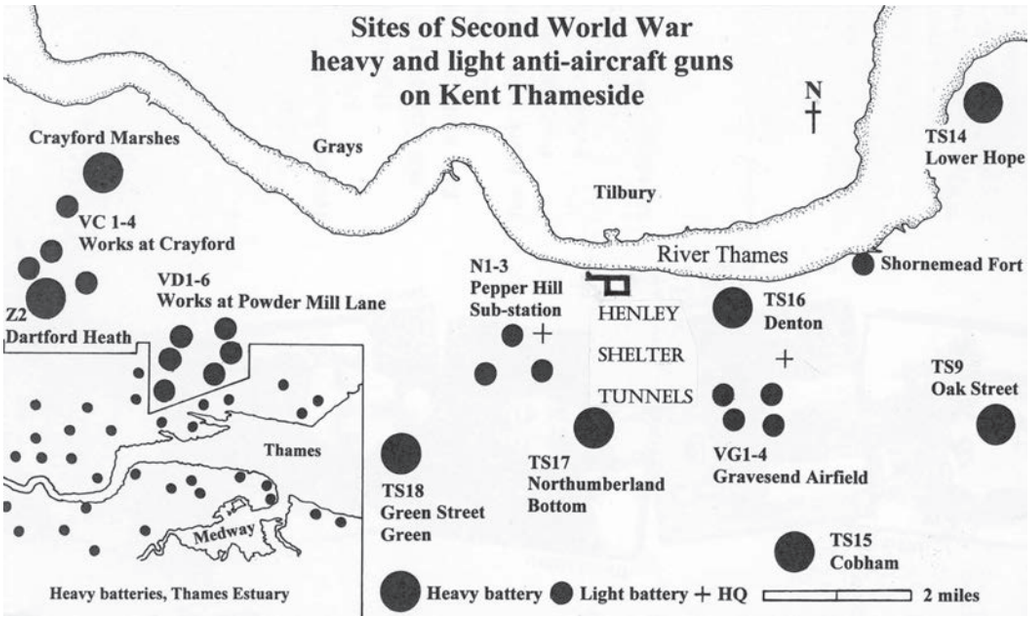


Installation of a Carrier Unit in a shelter for 100 persons.

Carrier Engineering Company Ltd

24 Buckingham Gate, London.

Advertisement from a supplier of gas defence air filtration systems for shelters, published in 1939



Map of the Second World War anti-aircraft gun sites on Kent Thameside. Drawn by Victor Smith 2009

Such concerns led to the Reorientation Scheme against Germany in 1934. This included two strands: first a strengthening of Britain's active air defences in the form of greater numbers of more modern military aircraft and a scheme for gun defence on the ground, including Kent Thameside becoming part of a projected – and later implemented – Thames and Medway Gun Defended Area; second, there were enhanced efforts, taken forward in 1935, by a new department at the Home Office, to achieve effective measures of civil defence.

Initially, and for about two years or so, the latter was attempted by means of promotion and persuasion but this came to be succeeded by statutory requirements. In consequence, protective measures began to be introduced in the community in the form of groups of organized personnel and volunteers, who would be brought into action shortly before, during and after air raids, and who were to operate from a network of warden, first aid, fire and rescue centres. Control centres were to provide coordination of these assets and of the civil defence response. Measures were also to include industry. Nevertheless, preparations in Britain were said to have been more than matched by those of other countries, such as France, Germany and Soviet Russia.

The concurrent example of death and destruction from air bombing during the Spanish Civil War served only to increase the perceived urgency for civil defence preparedness. Not least did this provoke the appearance of the influential book *ARP* by J B S Haldane in 1938. The use of poison gas as a weapon of war had been suggested in the nineteenth century and featured in the stories of H G Wells. The memory of its actual use on the Western Front during the Great War and knowledge of its recent employment from the air in 1935 by the Italians in Ethiopia, and in 1937 by the Japanese in China, had additionally focused the minds of defence planners.

Government had begun to consult with industry and representatives of national infrastructure in 1936 and to issue guidance for shelter provision in these sectors, such as 'Air Raid Precautions in Factories and Business Premises'. Initially there was a somewhat muted response in taking first definite steps, although it is known that some companies such as I.C.I, Boots and Harris Lebus did so. The owners and management of the Henley factory would have been a typical candidate for such consultation but there is no surviving record of this. Haldane criticized government guidance, following the Civil Defence Act of 1937, as being 'beautifully vague'.

The scare of the Munich Crisis in 1938 drove a determination to do more. Government became more assertive in its Act of 1939. A requirement for civil defence and, in phases sheltering, whether for industry or for the population, was of course as much about ensuring national resilience in war as being humanitarian in intent. Air-raid precautions increasingly became a preoccupation of architects and engineers as well as of commercial companies intending to benefit from new business opportunities. Their articles in journals and booklets, supplementing and reinforcing the guidance of government, are a window into contemporary thinking.

Immediate origins

Under the Act of 1939 measures for air-raid precautions in industry became mandatory, so that workers could expect – by law – the provision of protection from those by whom they were employed. A code of that year set out a standard of protection. As described elsewhere, measures were to secure against blast, splinters and debris but, in general, not against a direct hit. The resistance of various types of material against bombing was set out.

Henley at Northfleet had become an important specialist industrial centre. This grew out of the emergence of the Age of Electricity, being chiefly a manufacturer of electric cables, distribution equipment, connection boxes and of insulating materials. Following its beginnings elsewhere in the previous century the company had expanded in 1903 to buy land for a new factory north of Crete Hall Road in Northfleet. This grew in size in 1910 and 1926, as well as in 1939, on ground previously the famous Rosherville Gardens, on the south side of the road. By then the works had also been producing rubber vehicle tyres for nearly twenty years.

Postcard, c. 1906, showing part of the former Rosherville Gardens in front of the cliff face, later tunnelled into to create the Henley shelter complex

Premises, such as Henley's, with more than fifty staff were required to have shelters for the staff who worked within them, a policy from 1936 for them to be sent home in the event of an air raid having been recognized as impracticable. Standards of protection, which included those of anti-gas filtration plant, were laid down in ARP guidance and Codes. For Henley's, and for the county of Kent, technical advice, if required, was available from specialists at the Home Office in Westminster. Costs were to be defrayed against the claim of a government grant and factories were required to provide progress reports by August 1939. Factory inspectors were empowered to carry out monitoring visits.

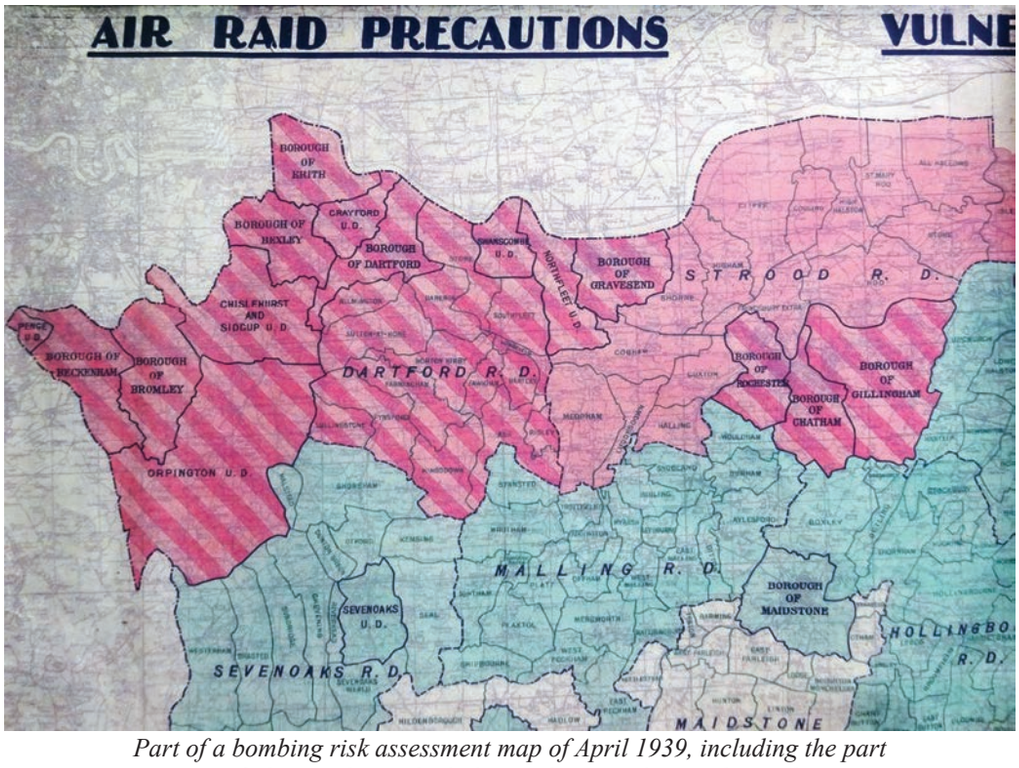
The shores of the Thames below London were recognized as containing vital industries and national assets. Within that, and including Henley's, the Northfleet parts of Kent Thameside were the home of important other industries and facilities such as Bevan's Cement Works, Bowater's paper factory and other paper suppliers, as well as the Red Lion manufacturing and repair wharf. In a bombing risk assessment map of April 1939, Kent Thameside was given the highest category of bombing vulnerability and priority for shelters.

The Act was a signal for industry to consider urgently what it needed to do. Henley's must have acted quickly with planning and preparation of a design because cutting of the tunnels was reported in early 1939 to be imminent and appears to have been underway by June, the time to completion being later reported to have been 'about 10 months'. Government felt a need to define the meaning of an air-raid shelter and, in its Code of August 1939, did so by explaining that this was a means of 'protection otherwise than by war-like means…from hostile attack from the air…'

There were other tunnel shelters as well as surface shelters nearby, for the personnel of Northfleet and Swanscombe cement works with sundry surface shelters for the local factories, and further tunnels for civilian, and perhaps some industrial users, under The Hill at Northfleet and elsewhere. Regional Commissioners had power to coordinate civil defence in their designated areas across the country, the Henley site coming within Region 12, which covered Kent and Sussex and whose headquarters were at Tunbridge Wells.

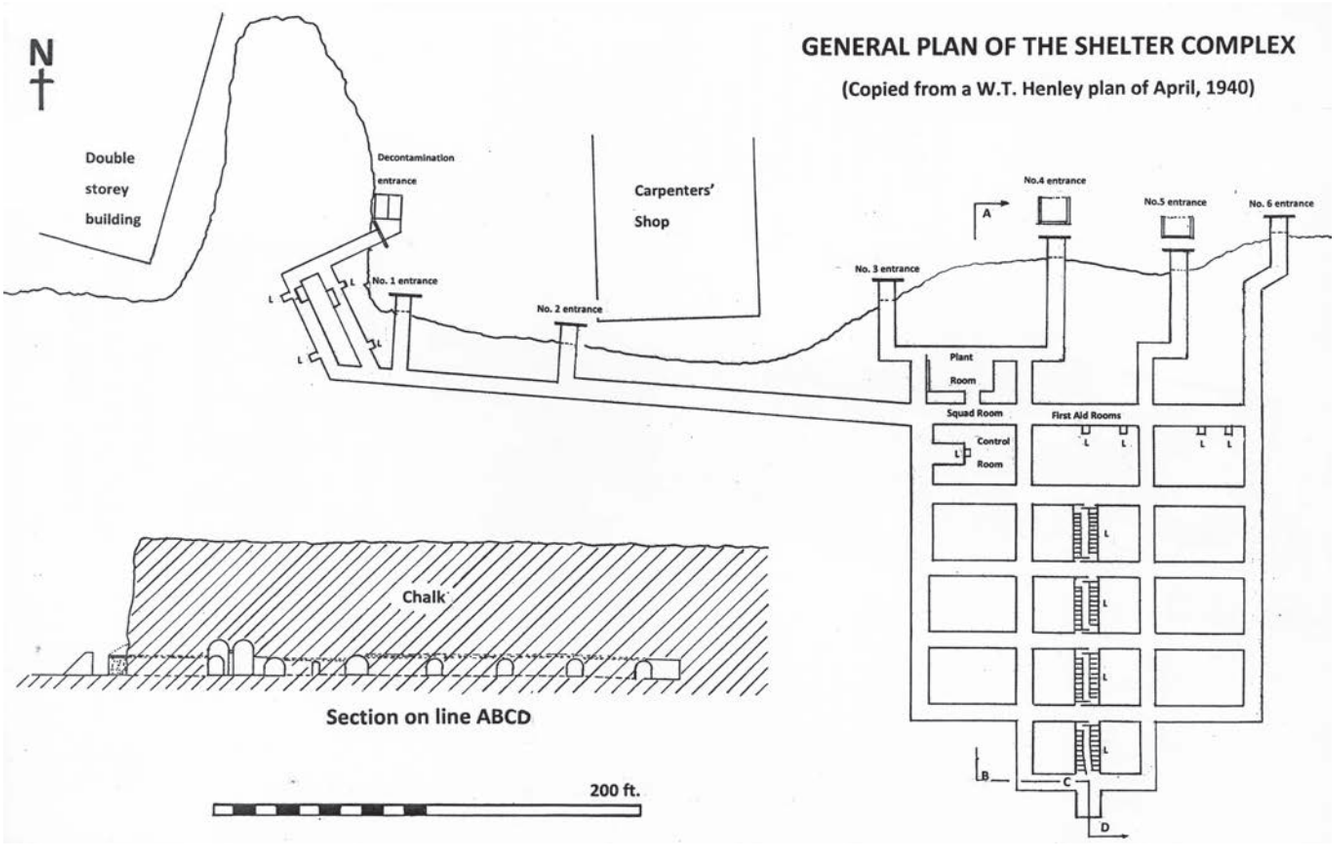
Design

As recorded in a plan by W.T. Henley of April 1940, the complex is on a rectilinear grid-iron plan. A drawing made by Gravesham Borough Council in a recent rendering of a plan apparently dated March 1941, shows an almost identical layout.



Part of a bombing risk assessment map of April 1939, including the part of Thameside in which the Henley tunnels were located

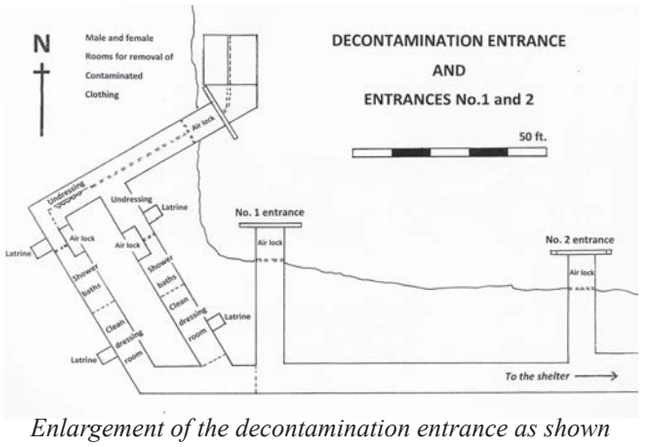
The plan of the complex was one of a number of contemporary design approaches dating from 1936 for the layout of a large-capacity refuge. The chalk overhead provided ample protection and shock absorption from the landing and explosion of bombs, the semi-circular arching of the tunnel being resistant to downward forces. The white-painted internal skin of 6-in of reinforced concrete applied to the walls and arch was a lining to the chalk. Shuttering marks may be seen. The floors, of



A copy of an April 1940 W.T. Henley plan of the shelter complex. Drawn by Victor Smith 2021

varying quality, were either concrete or compacted stone laid in mortar.

Within a short walking or running distance from the factory, the shelter was accessed through six gas-proof entrances/exits in the chalk cliff face. Post-demolition traces remain. Each had outer doors and inner ones, forming an air lock, which best design practice prescribed. There are surviving doors in steel plate. At least two of the entrances appear to have been fronted by blast walls.



Enlargement of the decontamination entrance as shown in the W.T. Henley plan of April 1940. Drawn by Victor Smith 2021

Moreover, and following the approach adopted elsewhere, the angled entrance passages reduced the effects on shelterers of an otherwise unrestricted blast-wave from a bomb exploding at factory level outside. There was a seventh special decontamination entrance with similar protection. In keeping with other very capacious shelters, the number of entrances had to be adequate to ensure unimpeded transit of the large numbers of people expected to enter and leave the shelter at the same time. Entry was required within seven minutes of a warning having been given.

Fear of gas attack

The decontamination entrance and two of the others gave access to a communications tunnel (or travel gallery as it was officially called) and which led into the shelter area. The other four entrances led more directly into the latter. The decontamination entrance is shown as having a projecting entrance structure in the plan of 1940 but the plan of March 1941 does not. Demolition of this area has removed the evidence and air photographs and maps are unclear. In either case, and as is evident today, it was divided into separate areas, with disrobing rooms for women or men who might have been contaminated in the event of an attack with chemical weapons.

There were cleansing showers, first aid and dressing rooms, stores of replacement clothing being held ready. Scales of equipment and supplies for a decontamination facility were laid down, including bins for contaminated clothing, anti-gas ointment, bleach paste, soap and towels, eye douches and distemper brushes. Within the shelter grid was a command post or control room, linked by telephone to protected outside observers who would report the situation during and after a raid, advising when it was safe for the shelterers to leave and, if possible, return to work.

The air conditioning plant room in 2007. Photo Ed Combes

One of the outside posts for observation was a blockhouse on a cliff overlooking the factory. This was reached by scaling the 110 rungs of three ladders lashed together and pitched sheer up the cliff face. There was also the nearby staircase to the cliff top from the Rosherville Gardens days but it is unclear whether this was accessible at the time.

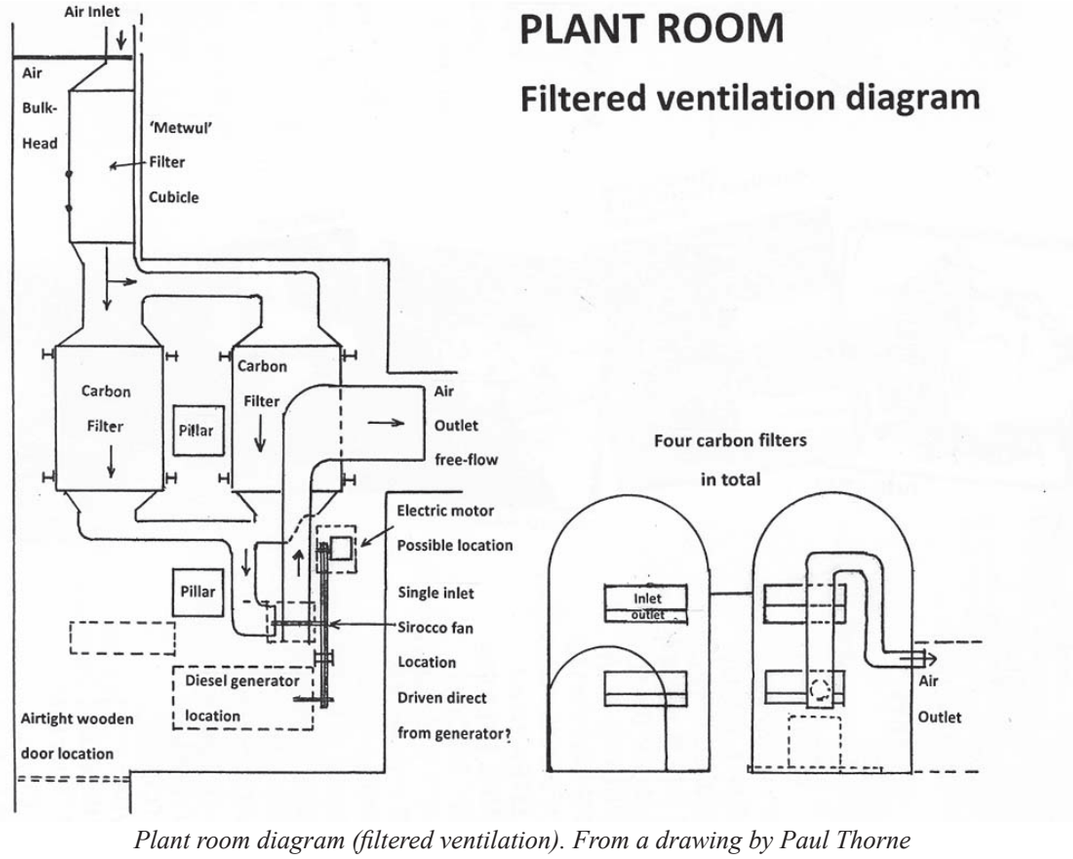
Inside the shelter there were also first-aid rooms and a room for shelter wardens and others, apparently made by dividing a passage with temporary partitions. Latrines were provided. Official guidance was for there to be an equal balance of plumbed-in toilets and chemical ones but the Henley tunnels appear to have had mainly chemical, utilizing Elsan buckets. According to the plans of 1940, these were provided on either side of a central latrine tunnel, in individual cubicles. Although a large number of Elsans are to be seen today, there is no trace of cubicles, unless they were of light, portable form. There is perhaps a sense that the arrangement to be seen today might, in some details, not entirely reflect that shown in the plans. Recesses for Elsans may be found in the decontamination entrance, the first-aid and squad rooms and in the control room. Pipework for water may be seen in various places, including at the northern end of the central latrine tunnel (possibly indicating the former presence of a handbasin). There is a waste water gulley under the floor nearby.

Essential ventilation

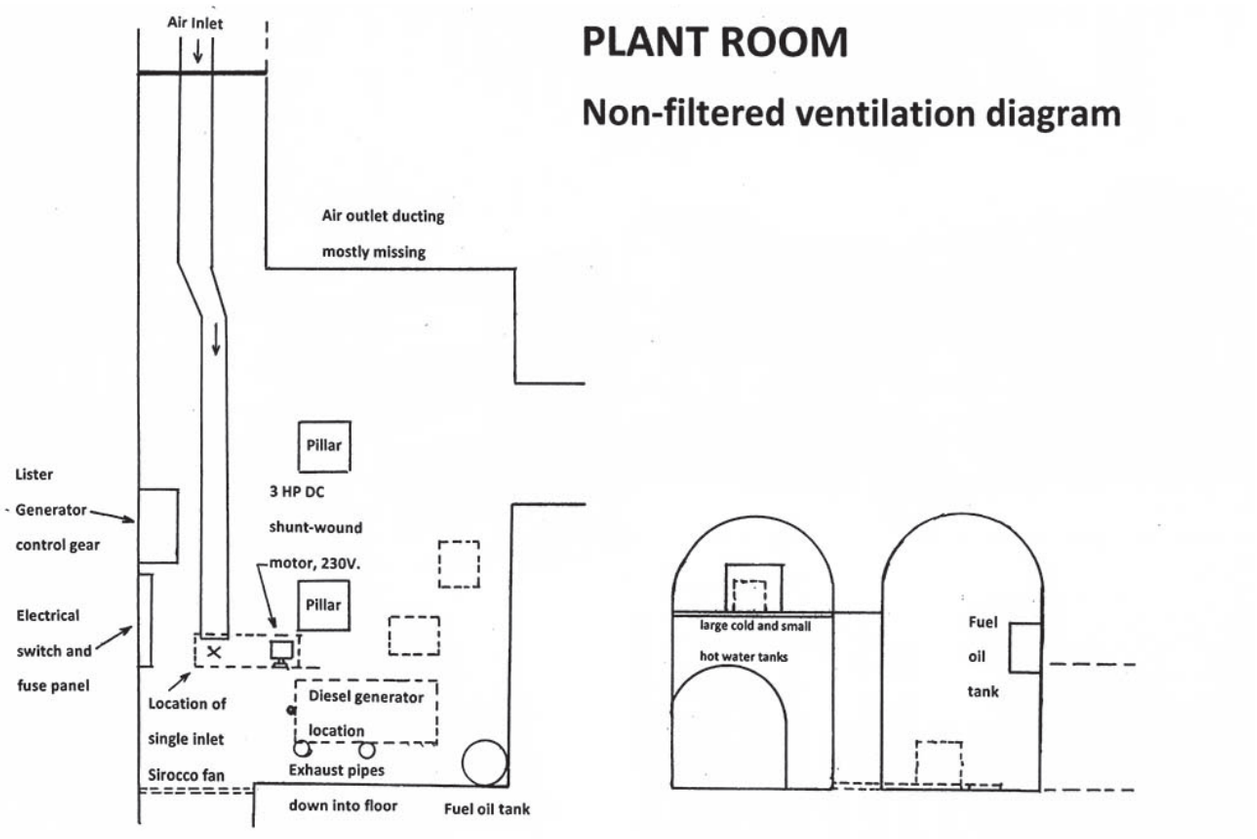
Safe breathing of the air within the shelter was achieved by the provision of ventilation and gas filtration, powered from an internal engine or plant room. The equipment concerned was a mechanical science in itself and manufacturers offered a selection of types. As a general rule, the larger the shelter the larger the required equipment. Indeed, the Henley engine room was, in effect, two-storied in height, containing generating plant to (a) power air movement and filtering systems to prevent the entry of war gases, and (b) to provide a stand-by supply of electricity for lighting, the public mains being used pending its disruption or failure. Both bare and conduit-mounted cables were connected to a succession of exposed light bulbs.

It was recommended for such shelters that electric torches be kept ready in the event of failure of both the mains supply and the standby set. Ventilation was by forced draught, the air being drawn in from the outside, where traces of intakes may be seen, to be passed through the anti-gas filtration equipment and circulated through the tunnels by ducts, of which traces remain. The air was reported to have been changed every sixteen minutes.

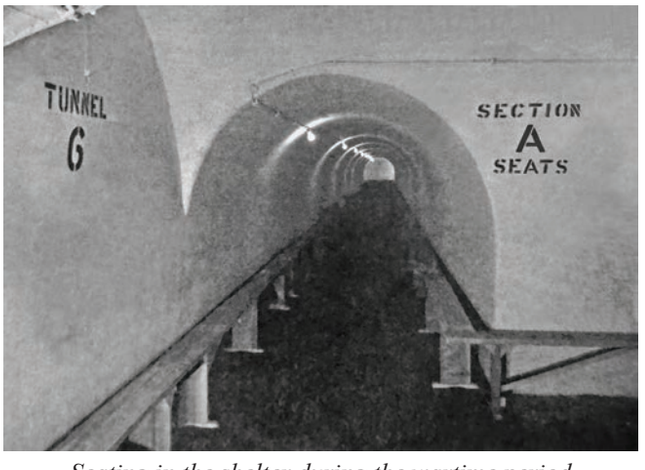
Paul Thorne examined and commented on this plant in 2003, noting that there appear to have been two independent



Plant room diagram (filtered ventilation). From a drawing by Paul Thorne



Plant room diagram (non-filtered ventilation). From a drawing by Paul Thorne

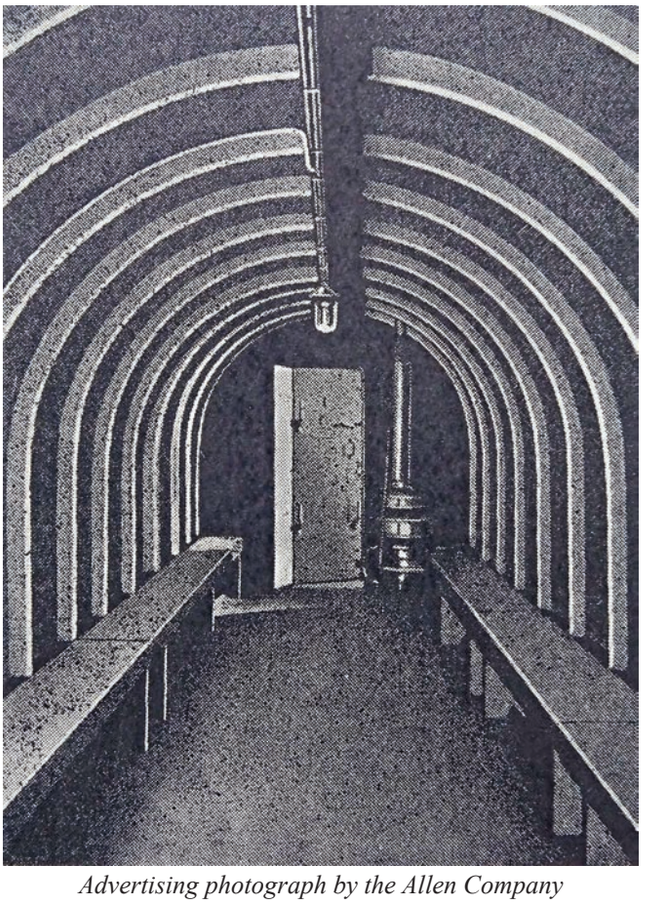


Seating in the shelter during the wartime period

ventilation circuits, one with two-stage filtration and the other without. Neither could run unless the generating set was also operating. One seems to have been mechanically driven by a (now missing) diesel engine, whilst the other needed Direct Current power to run its motor, and only a DC generator could provide this. Either fan would positively pressurize the main cross tunnel, thus expelling air at all the entrances except the one (No. 3) containing twin air intakes.

Paul Thorne has added that 'a changeover switch would have allowed the tunnel lights to be switched from external mains AC or DC generator, both at 230V. But either fan drive would be run entirely off the generator engine, either directly, or via a DC generator to run the DC motor.'

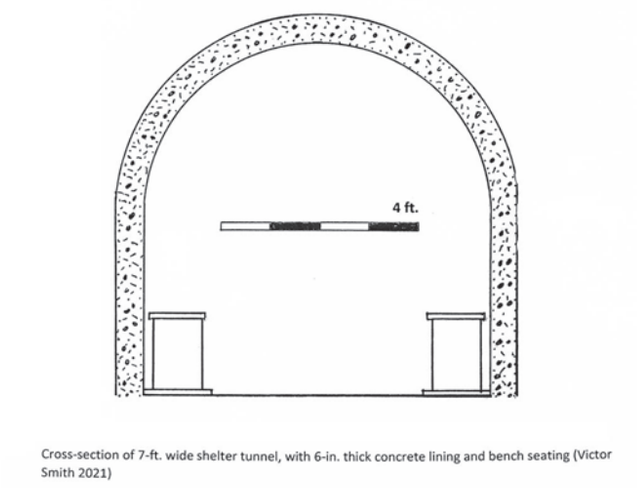
The 7-ft wide tunnels had moveable bench-seating along either wall, with further seating along the centre of the larger 10-ft wide ones, as marked in lettering on the walls.



Advertising photograph by the Allen Company showing typical bench seating, 1939

This consisted of horizontal wooden planking resting on vertical boards at intervals, in turn fixed into transverse floor bearers. This was one of a number of typical seating

designs for shelters, something similar being shown, for example, in an advertising photograph of the Allen's company. There was extensive painted directional and other signage throughout to help guide the shelterers as they entered, so avoiding confusion and congestion.



Cross-section of 7-ft. wide shelter tunnel, with 6-in. thick concrete lining and bench seating (Victor Smith 2021)

Cross-section of one of the 7-ft. wide tunnels. Drawn by Victor Smith 2021

Each shelterer was given a card identifying their reserved seating. There is no evidence of there having been provision for sleeping spaces, although if need be, these could have been extemporized. The 14 ft x 10 ft room at the centre of the southern extremity of the tunnel system may have been designated as a strongroom for storage of company and factory records.

Tight seating

Legal requirements were for the capacity of a shelter to be that of the maximum number of employees and of any anticipated increase. A study of seat numbers painted on the tunnel walls suggests that there was provision for around 2,500 shelterers, each of whom would have had a planned seating space of 1ft 6in to 1ft 7in, a not untypical situation in other shelters and a generally expected minimum, which was to provide for ten people within a bench run of 15 ft.

Section of tunnel showing recess for Elsan chemical toilet in 2007. Photo Nick Combes

The shelter was contemporarily reported to have had capacity for 2,300 people, but that up to 3,000 could be accommodated in an emergency, presumably involving some use of space in the travel gallery. The same commentator remarked that 'This 2,500 feet tunnel system….was designed by the people at Gravesend Works [Henley's], the Holborn Construction Company being responsible for construction and concrete lining. Altogether, about 8,000 tons of chalk have been excavated. The entrances are built out from the cliff face as solid structures – a measure designed as a safeguard in the event of heavy falls of chalk from the cliff face….'

Intersection of tunnels in 2007. Photo Nick Combes

The chalk was taken out on skips running on rails while 'concrete, mixed in a mechanical mixer outside, was being brought in by another – similar to the transport system in a colliery.' It has been suggested that the initial stage of the digging out obliterated some grottoes which had been created for the earlier Rosherville Gardens, although the evidence for this is unknown.

Signage painted in black on the walls gave occupants directions to the first-aid rooms and to the designated seating spaces. Other signs stated that 'Smoking is strictly forbidden'. On the trunking in the plant room has been found pencilled 'To Hell with Hitler'. At the decontamination entrance are the words '534 Works Dep', of unknown date.

Travel Gallery in 2007. Photo Nick Combes

Importance of protecting Henley's workers

The attention given to the protection of Henley's workers was underscored by the factory being a key and strategic industrial site, whose role was crucial to the war effort in all its stages. Examples of Henley's increasingly diverse

Electrical box in passage in 2007. Photo Ed Combes

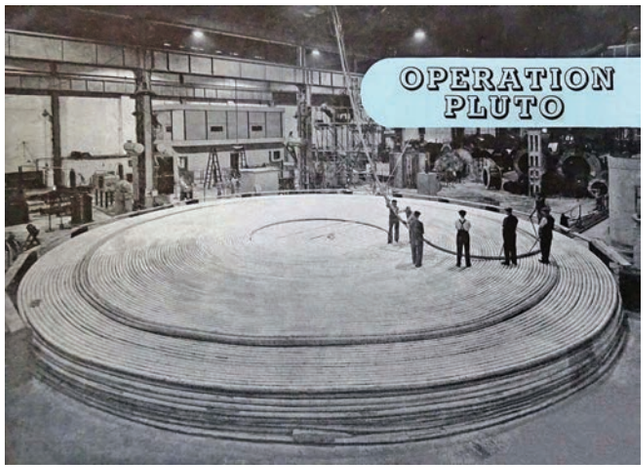
Inside of one of the entrances in 2007. Photo Ed Combes

and vital war-effort manufacturing were:

- 14 million gas masks for adults and half-million for babies
- Cables used on ships as a countermeasure against German magnetic sea mines
- Cables used offshore to detect and connect with explosives to destroy submarines
- Rubber tyres for military vehicles
- Ear defenders for soldiers
- Communication cables
- Millions of parts of artillery shells, mortar bombs, rocket firing apparatus, aircraft fuel tanks and small-arms ammunition
- For the liberation of Europe, the innovative Pipeline Under the Ocean (PLUTO), to supply fuel for the Allied armies once they had landed.

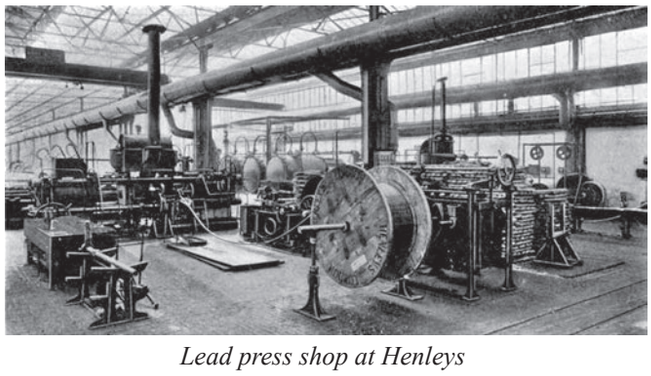
Working parties and others brought in from outside the factory could be called upon to clear rubble and debris in the event of bomb damage and to repair machinery. Civil defence teams were on hand to decontaminate the factory buildings in the event of an attack with gas.

The agent used might have been of a poisonous, irritant or blistering nature, whether of a persistent or non-persistent kind. Most, but not all, types of gas could be discovered by a range of special detector sheets around the factory



Manufacturing area at Henleys for PLUTO: Wartime photograph

Gas masks were also made at Henleys: Wartime photograph



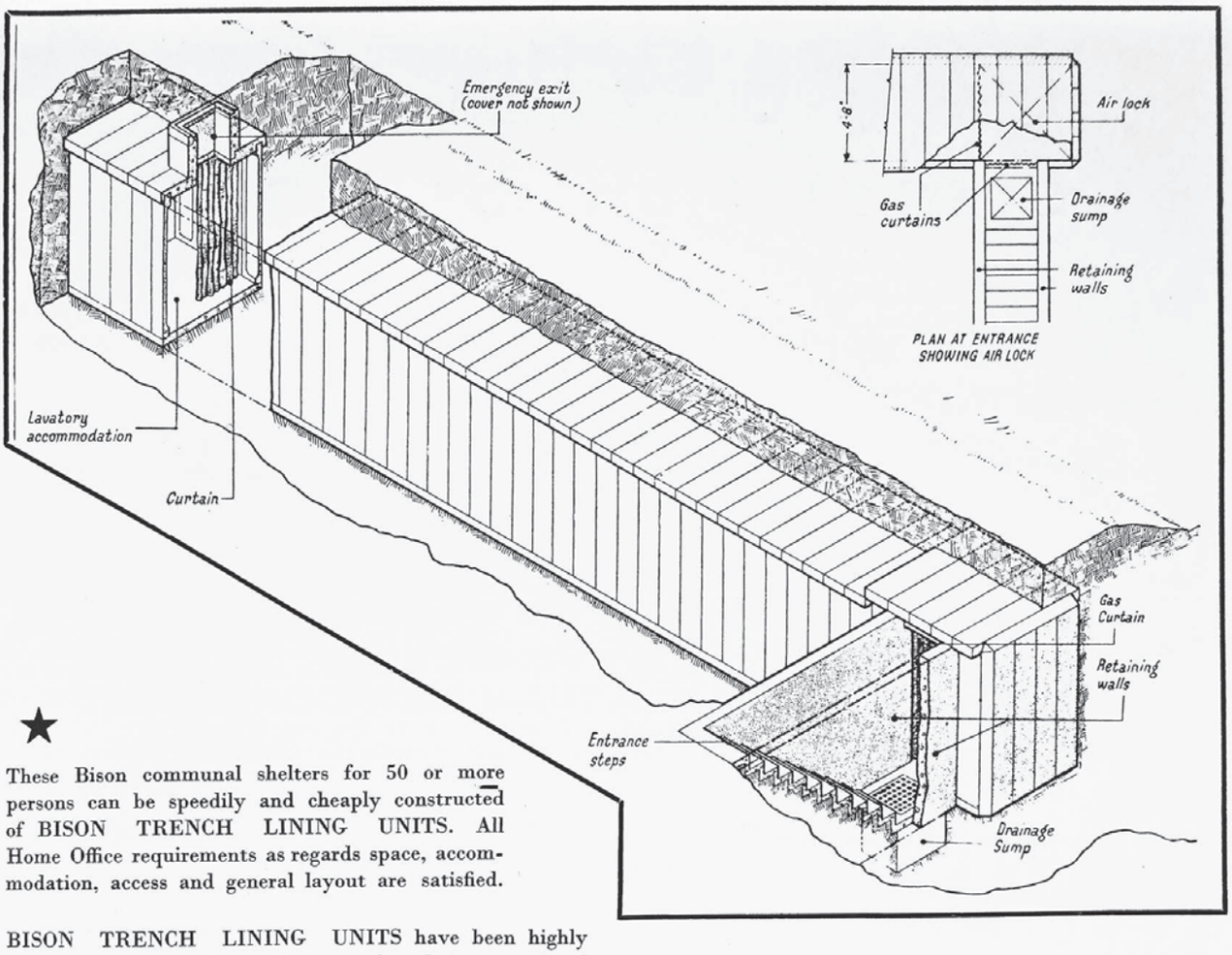
Lead press shop at Henleys

premises. Decontamination workers, who followed well-prepared procedures, had available to them a range of equipment and large stocks of bleach with which to treat surfaces. Rescue and first-aid detachments were similarly prepared and had a large supply of the plant and other things they needed.

Use of the shelter

No documents have yet come to light recording the frequency of the occupation of the shelter. The industries

BISON trench-type INDUSTRIAL SHELTERS



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These Bison communal shelters for 50 or more persons can be speedily and cheaply constructed of BISON TRENCH LINING UNITS. All Home Office requirements as regards space, accommodation, access and general layout are satisfied.

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xxi

An advertisement for another type of industrial shelter, similar to some other civilian types

of Northfleet on Thameside were a tempting target, but they did not receive quite the determined and focused bombing attention they merited. Anecdotally, Henley's was, however, bombed at least once, resulting in the sight of banknotes floating in the air from the inside of a damaged factory's pay office.

The theoretical procedure was for the employees, carrying their gas masks, to be evacuated into the shelter upon hearing an air-raid alert and then, as earlier mentioned, to return to their work places upon the notification of an all-clear and after a judgement had been made by a coordinator that it was safe to do so.

How often a factory evacuation and shelter occupation was practised is unknown. The hope and intention was for the occupation of the shelter to be accomplished promptly on receipt of a bombing alert and so shelterers would already be safely inside and protected should an attack include the use of poison gas.

In the event of the latter starting without warning, there might have been some confusion as the shelter began to be occupied and there are perhaps questions concerning the ability of the decontamination entrance to cope with a possibly large through-put of people. The number of combined entrances/exits was a pragmatic substitute for the provision of separate emergency exits.

Brick partition wall (right) in the tunnels in 2007. Photo Nick Combes

Henley Home Guard in 1941

Inside the shelters

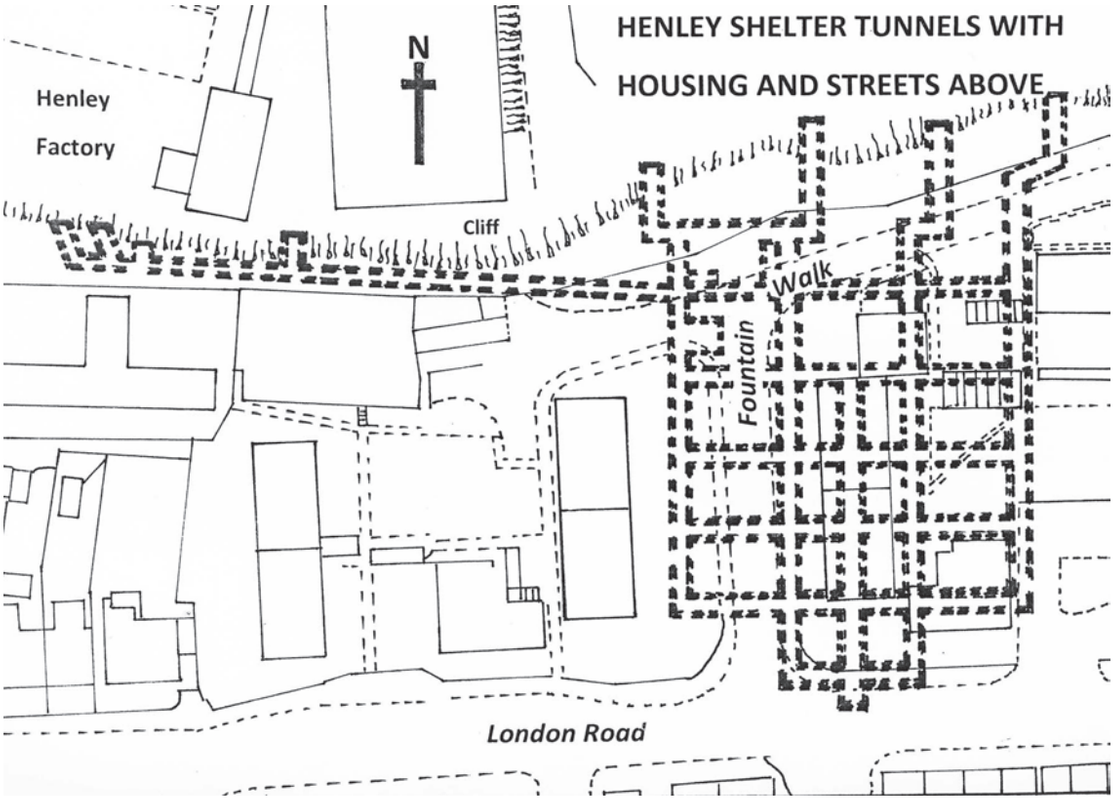
The gathering of people in communal shelters was a needful social phenomenon of the war, in this case of a specific group of people. What conversation took place in them is unknown. At times during shelter use there was, by report, some informal entertainment in the form of sing-along. Whether there was provision for the supply of drinks to shelterers is unknown. There is no evidence of there having been a kitchen.

Henley staff taking shelter in the tunnels at an unknown date, perhaps as a drill: Wartime photograph.

Air-raid alerts could hold up factory production. During the course of the war, there were 1,252 in Northfleet and Gravesend but how many of these resulted in cessation of work at Henley's and shelter occupation is not known. It may be that, as at some places elsewhere, a retreat to the shelter would not have taken place until bombing had actually started sufficiently close-by to be seen as an approaching threat. The walls of the shelter do not exhibit the marks of soiling or wear which might have been expected to result from frequent occupation.

Kent County Council's simplified characterization of the air war in their report of 1946 was of a period of comparative lull from 3 September 1939 to August 1940; greater activity during August 1940 – August 1941 (during which time the Battle of Britain took place, when there were many overflights of the area); a second lull from August 1941 to January 1943; sporadic raiding from January to April 1943 and the V1/V2 attacks from June 1944 to March 1945.

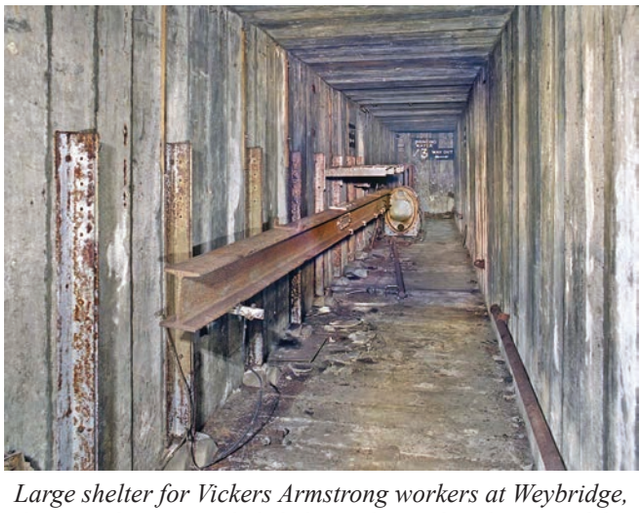
Henley's North Woolwich works in the dockland district of London suffered repeatedly from heavy air raids resulting in death, injuries and destruction of buildings and plant. As Henley's at Northfleet 'had fared better in the raids', it was decided to transfer some manufacturing there.



Map with the shelter superimposed on the layout of post-war housing and roads, after an undated Henley plan. Drawn by Victor Smith 2021

Postwar uses

As for shelters everywhere, use of the Henley complex ceased with, or rather shortly before, the end of the war. It might have been a candidate in the early Cold War for inclusion in a national list of shelter assets for possible future utilisation. Indeed, it was briefly considered as a candidate for adaptation of part of the tunnels as a local Civil Defence Control Centre but the final choice lay elsewhere.



Large shelter for Vickers Armstrong workers at Weybridge, Surrey. The now sealed shelter is located at the rear of the car park for the David Lloyd health club at Brooklands. Evidence of later production is seen in one of the shelter tunnels in 1999. Wartime signage is seen on the end wall. Photo Nick Catford

In 1959 Henley's was acquired by Associated Electrical Industries, then in turn by the General Electric Company in 1967, and renamed GEC Henley. It has been reported to the writer that in 1975, if not earlier, the tunnels were used

The Littlewoods Pools building in Liverpool was used for the manufacture of Halifax Bombers during the war. A large shelter complex was constructed by cut and cover for workers to one side of the factory. When specially opened for members of Sub Brit in October 2012, the tunnels were still in good condition but only wartime graffiti remained to be seen. Photo Nick Catford

as an extension to the Engineering Drawing Department of the factory, having draughtsmen working at drawing boards. This was not a conducive environment for such work and would have required adequate lighting.

By this date, the outcrop of chalk containing the decontamination entrance had been demolished. The tunnels were subsequently, and until the later 1980s, an assembly area for Special Accessories, in the main, products for the offshore oil industry. In time, some of the tunnels became a repository for a variety of discarded scientific and laboratory equipment from the factory. Some factory records were also kept inside, including papers from the 1950s.

The eastern end of the tunnel complex was partitioned in brick during the postwar period, presumably in support of some of these activities. Some of the timber flooring in evidence might have originated at this time. Also, at an uncertain date in the postwar years, the internal air-lock doors were removed and outer doors and entrance facades altered. In 1997 the company was taken over by TT Electronics in 1997 and, in 2010, by Groupe Sicame.

Housing development

In the first few years after 2000 the Henley factory site became earmarked for future development and the contents of the tunnels were subsequently removed. Following gradual clearance of the factory buildings, not complete until fairly recently, the ground in front of the entrances to the shelter entrances was raised from the deposition of material excavated from the London Crossrail project. After settling, this became the site for construction of housing by Keepmoat Homes, at present (2022) in progress.

One of the entrances to the shelter complex at Henleys in 2021. Photo Victor Smith

The remnants of the decontamination entrance at Henleys in 2021. Photo Victor Smith

Because it is below the housing of Fountain Walk and associated land, which are in the ownership of Gravesham Borough Council, the shelter is owned by the latter which, for safety reasons, maintains the cliff faces and has covered them with wire mesh against falls. The approaches to the cliffs and tunnel entrances across the development site are in other ownership.

Other types of wartime shelters

Just as surviving pillboxes symbolise Britain's anti-invasion defences during the Second World War, so air-raid shelters define the years-long imperative to provide passive protection against the threat and reality of bombing from the air. Many thousands of shelters were built across the country. Such protection varied widely from use of basements, strengthened or otherwise, to small designed private shelters next to (or within) homes. These were the 'Anderson' and the 'Morrison' shelters, provided free or sometimes bought from government via local authorities, added to which were communal shelters for the public, industry and for service personnel. The latter three categories could be surface, semi-surface, blockhouses inside buildings or underground, whether in freshly tunnelled spaces or the adaptation of existing ones.

Control Room at Henleys in 2021. Photo Victor Smith

Industrial shelters had the same basic frame of reference for design as for most of the other types. Contrasting with Henley's shelters at Northfleet, some were used for the protection of production, such as at the Carrow Works complex in Norwich. This had a similar layout but was smaller in extent. The vulnerability of the Plessey factory in Ilford led to the transfer of manufacturing to future Central line tube tunnels nearby. Some aviation production of Short Brothers took place in chalk tunnels in the hillside at Rochester, not far from Thameside.

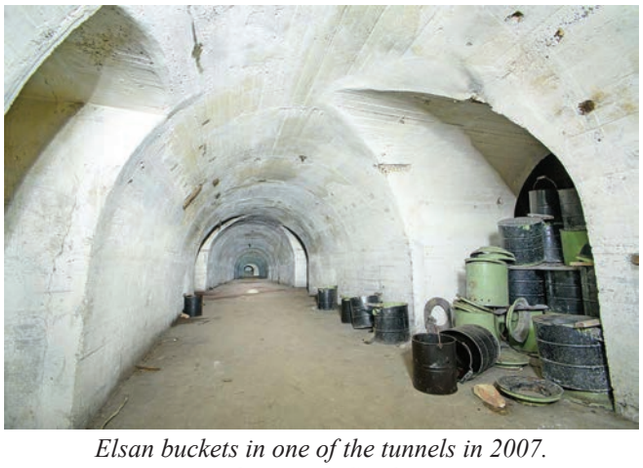
Some shelters for workers were built into the design of the buildings of recently-constructed factories, such as at Park Works, Kingston-upon-Thames and elsewhere. Blockhouses were sometimes used as shelters inside factory working areas, exemplified in the wartime motion picture *Millions Like Us* (1943). Henley's North Woolwich factory had no space for underground shelters so it used strengthened ground-floor areas as refuges.

Another example of shelters for a large number of workers comparable with Henley's was the complex for the Ekko factory in Essex, although this was cut-and-

The eastern opening to the air conditioning plant room (right), with a turning in the tunnel to the left to the shelter spaces and the first aid room in 2007. Photo Nick Combes

cover in fields close to production. A network of shelters for workers at the Courtauld factory at Halstead, Essex is featured on page 86 of this issue of *Subterranea*. The exposed quarried chalk faces along the riverine parts of Northfleet and Kent Thameside had offered ideal points of entry for the creation of tunnel air-raid shelters, for the protection of both industrial workers and civilians. Some of the tunnels selected for use as shelters already existed as communications between riverside works and nearby chalk quarries, only needing to be adapted or extended.

In these categories, west of Henley's was a possible tunnel behind Bowaters, and as previously mentioned five tunnels under The Hill at Northfleet, several at the Northfleet cement works, others in rear of similar works at Swanscombe as well as at Greenhithe but these were not of the same regular design and scale as those for Henley's. Elsewhere in the county of Kent were the tunnel shelters in Chislehurst Caves, at Ramsgate, at Dover and, as mentioned above, Rochester. There were others in South Essex. New large tunnel shelters were also proposed for a number of major inland urban locations in Kent but these were not proceeded with.



Elsan buckets in one of the tunnels in 2007. Photo Nick Combes

Bunker mentality

As exemplified by the use of the London's tube tunnels and platforms, protection in places deep underground could instill in people a soothing sense of security, usually justified by the resistant qualities of a thick protective overburden. Indeed, concerns were expressed at one stage that shelterers at Ramsgate and elsewhere might become reluctant to come out again.

Vertically, the Henley tunnels fulfilled the official definition of a 'Deep Shelter', in which shelterers were officially regarded as being in no danger from bomb-induced concussion. Their entrances were, of course, at factory level, at risk from bombing and horizontal blast but, as earlier suggested, it was presumably considered that the effects of the angled entrance passages to the shelter areas and the barrier of chalk were sufficient protection.

As commented in a report by CGMS, 'in terms of national significance, the complex at Northfleet is mentioned explicitly within Historic England Guidance (2016) on civil defence structures as a surviving example of underground World War Two industrial air-raid shelters. Indeed, the county of Kent is noted for this and one other shelter of a similar type [the Shorts tunnels at Rochester], indicating a degree of national and regional significance…..' and, as noted within Historic England Guidance, the painted signage found within the tunnels at Northfleet 'adds markedly to the historic interest of a civil defence structure. This contributes to the significance of the site due to the rare nature of this signage in other air-raid shelters of this type, and indeed of other types, that survives.'

The tunnel seen from entrance 4 in 2007, with a no-longer present wooden door of unknown date and ventilation trunking above. Photo Nick Combes

Despite the mutilation of its entrances – especially regrettable in the case of the decontamination area – the complex is noteworthy for its large size and the completeness of its layout, representing an historically ideal template for design. The remaining machinery in the plant room exemplifies the technology of its age. It is a scarce surviving example of its type in the southeast of England. Its importance is underscored by its relationship with key Thameside industry, symbolizing a crucial national industrial effort during a most challenging period of world war.

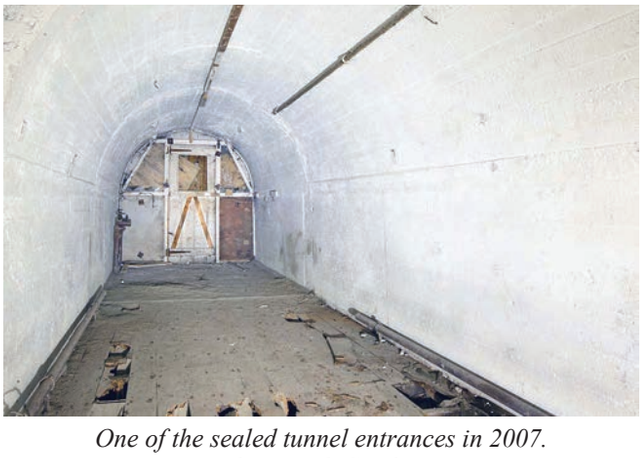
These factors argue for consideration to be given to its statutory protection. Its entrances should be secured against intrusion and the carrying out of damage, already evident in the presence on the walls of painted graffiti.

Looking south along Tunnel 3 in 2007. Tunnels 3 - 6 are parallel with each other and are linked by cross passages which are seen on the left. The tunnel to the right leads to the decontamination entrance and entrances 1 and 2. Photo Nick Combes

Necessary conservation measures

A road under the cliff has been retained and security-fenced in order to provide access to Gravesham Borough Council for the purpose of external maintenance to guard against chalk falls. An electrical pillar has been offered by the developer to allow for the possibility of introducing an electrical installation inside. There is gated access to the road from a route across the development.

In this writer's opinion, and after the implementation of safety works, the tunnels are of sufficient historic interest to lend themselves to occasional public access via guided tours of selected areas, with suitable interpretation and display of related artefacts. The size and layout of the tunnels might offer the possibility of income-generating reuse, especially for storage, at the same time safeguarding their historical features. It is understood that the developer will be providing external interpretation of the tunnels.



One of the sealed tunnel entrances in 2007. Photo Nick Combes

Acknowledgements and thanks

I must thank Rod Le Gear and Paul Thorne of the Kent Underground Research Group for their participation with Thames Defence Heritage in a survey of the tunnels in 2003/4 and for their supply of notes afterwards. Robert Hall generously shared his notes, following a visit he made with

Looking north along Tunnel 3 in 2007; cross tunnels are seen to the left. Photo Nick Combes

KURG in 2016. The former Associated Electrical Industries and Groupe Sicame kindly facilitated visits to the tunnels at various dates and, most recently, Keepmoat Homes for visits by the writer in 2021 and 2022.

Historical information and suggestions were gratefully received from Wayne Cocroft, Jay Curtis, the late Ken McGoverin, David Neale, David Oliver, Roger Thomas and Paul Thorne. Reports by Kayley Page and her team in drawing attention to insecure places of entry to the tunnels and to the ingress of slurry from the outside were important in leading to remedial action being taken by the developer.

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ABOUT THE AUTHOR

Victor Smith read history at King's College, London, specialising in War Studies. He is an independent historian of British historic defences and has researched and reported on sites in Southern England, Scotland, Gibraltar, Bermuda and the Caribbean. In 1989/90 he was Chief Executive of the Brimstone Hill Fortress National Park in St. Kitts which he helped gain UNESCO World Heritage status. Victor Smith coordinated Kent County Council's 20th century Defence of Kent Project and was Director of Thames Defence Heritage from 1975-2011. His work has included, in partnership with Gravesham Borough Council, the restoration and re-armament of New Tavern Fort and the refurnishing and interpretation of a Cold War bunker in Gravesend. He was the chairman of the Kent Archaeological Society's Historic Defences Committee and five times President of the Gravesend Historical Society. He is currently engaged with many studies of historic defences in Britain and abroad.

KENT DEFENCE RESEARCH GROUP

The Kent Defence Research Group are dedicated to the discovery, identification, research, recording and preservation of historic sites and structures throughout Kent. We are an informal group, whose members reflect a range of skills and specialist interests, meeting every three months to update and discuss the various projects in which we are each involved and to plan our Group activities. We also look to share our knowledge and expertise with the wider heritage community and to make available the results of our research in the public domain.

We can be found on Facebook at:
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Or we can be contacted by email at:
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Kent Defence Research Group

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Promoting & Supporting the Great Heritage of Kent

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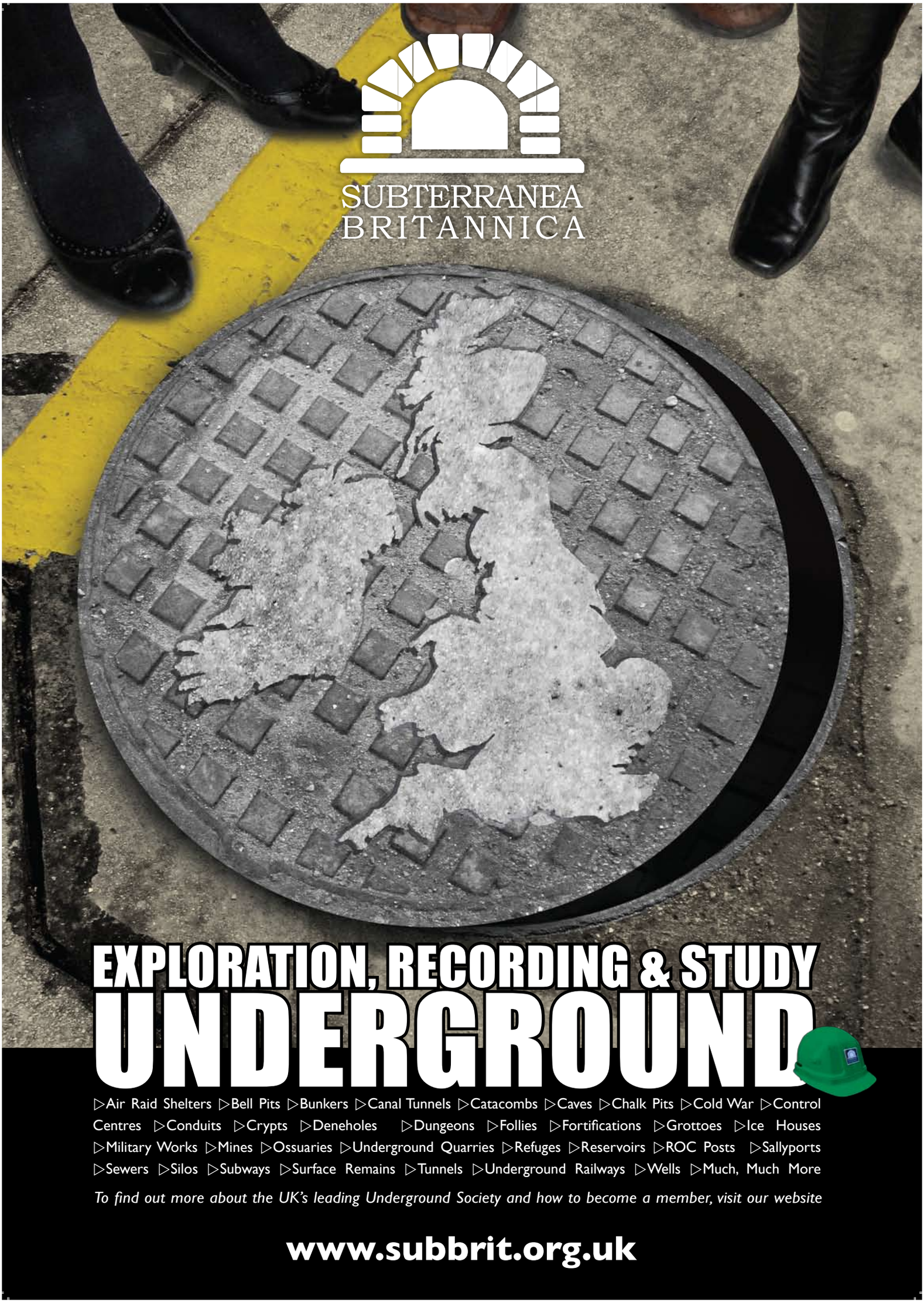
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